Clarion®

Owner's manual & Installation manual
Mode d'emploi et manuel d'installation
Manual de instrucciones y de instalación

# XN3210
# XN3410

**XN AMPLIFIERS**
**AMPLIFICATEURS XN**
**AMPLIFICADORES XN**

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## *INTRODUCTION*

The Clarion XN3210 is a full-featured, two-channel amplifier incorporating the following features:

- Specially coated circuit boards that resists mold, mildew and moisture damage.
- Pulse-Width Modulated (PWM) MOSFET power supply for maximum performance with minimal distortion.
- Remote turn-on with "soft start" muting to prevent turn-on "thump".
- Variable high-pass/low-pass electronic crossover with a 12dB per octave slope (adjustable range: 55Hz to 5.5kHz).
- Variable bass boost circuit to reinforce low frequency signals that may be lost due to subwoofer enclosure design.
- Adjustable input level controls with ground loop isolation to minimize noise and distortion.
- 2-ohm stereo stable, 4-ohm mono stable.
- Chrome-plated power, speaker and RCA connections.
- Speaker level input.
- Low profile construction with aluminum heat sink for efficient heat dissipation.

The Clarion XN3410 is a full featured, four-channel amplifier adding the following feature:

- Advanced circuitry design featuring bridgeable and mixed mode operation for use in various system configurations including 4, 3, or 2 channel systems.



## *ABOUT THE MANUAL AND WARRANTY*

This manual describes the basic requirements to install the Clarion XN3210 and XN3410 amplifiers. The installation of this amplifier can be quite complex to install. If you do not posses the necessary knowledge and tools to perform this installation, please contact your local Clarion Marine Audio dealer.
Keep all instructions and sales receipt for future reference and warranty information. Warranty information can be found on page 19 of this manual.

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## *DESCRIPTION*

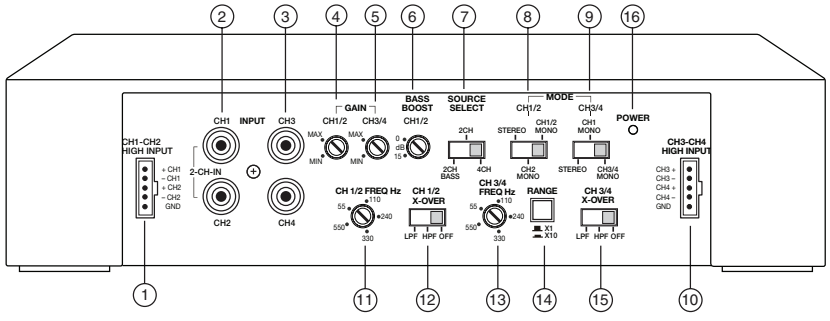
The XN3210 and XN3410 use an unregulated MOSFET power supply for superior sound and output wattage. In addition, a toroid-coil is used to transfer power with minimal performance loss due to heat. To avoid unwanted noise, a double-sided conformal printed circuit board with strategically placed components keeps AM RFI subdued.

All of the connections and controls for the XN3210 and XN3410 are conveniently located at the ends of the amplifier and labeled appropriately. To ensure the best possible electrical connections, the power, speaker, and RCA inputs are gold-plated. An additional benefit of the XN3410 is the ability to create a 2, 3, or 4 channel amplified system with a flip of a switch (see Application section). In the event of component failure or a short circuit, the XN3210 and XN3410 incorporate safe guards and outboard ATC fuses to prevent damage to the amplifier.

## *INPUT CONNECTIONS AND AUDIO CONTROLS*

The front panel of the XN3410 and XN3210 contain both connections for RCA and speaker level inputs, along with the audio controls as shown below.

**Fig. 1**
**XN3410**




1. CH1-CH2 High Input
2. CH1/CH2 RCA Input
3. CH3/CH4 RCA Input
4. CH1/CH2 Gain Control
5. CH3/4 Gain Control
6. Bass Boost
7. Source Select
8. CH1/2 Mode Switch
9. CH3/4 Mode Switch
10. CH3-CH4 High Input
11. CH1/2 Frequency Control
12. CH1/2 Crossover Mode Switch
13. CH3/4 Frequency Control
14. Frequency Range Multiplier
15. CH3/4 Crossover Mode Switch
16. Power Light Indicator



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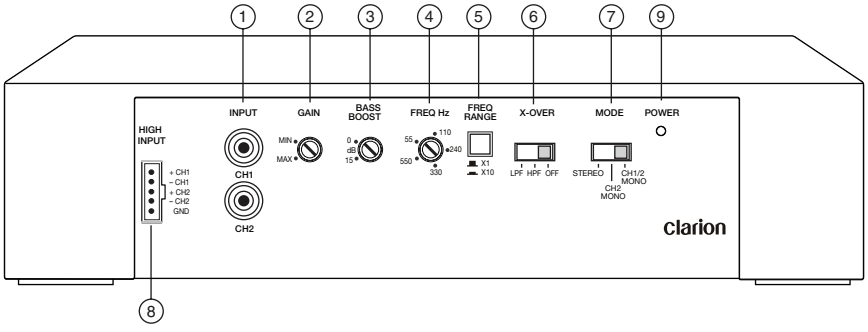
**XN3210**




1. CH1-CH2 RCA Input
2. Gain Control
3. Bass Boost
4. CH1/CH2 Frequency Control
5. Frequency Range Multiplier
6. Crossover Mode Switch
7. Output Mode Selector Switch
8. High Input
9. Power Light Indicator

The RCA connections are gold plated for optimum performance and low signal loss. The RCA connectors are labeled CH1 (front left), CH2 (front right) [for XN3410: CH3 (rear left), and CH4 (rear right)]. In applications where RCA signals are not present, the speaker level output from the head unit can be used. (Use one or the other input, not both.)

- **Gain Controls:** For the XN3410, separate CH1/2 and CH3/4 gain controls allow you to set the nominal operating level of the amplifier. The amplifier's input range, 200mV to 6.0V for RCA inputs and 500mV to 13V for speaker level inputs, can accommodate input levels from virtually any head unit.
- **Bass Boost:** The amplifier features a "high-Q" (i.e. narrow frequency band) Bass Boost circuit. It acts much like an equalizer with an adjustable gain from 0 to +15dB fixed at 45Hz. Use this feature to tune low-frequency audio response to compensate for a less than ideal subwoofer enclosure design. The added boost produces rich, full bass tones that are normally difficult to reproduce in the marine audio environment.
  NOTE: Bass Boost setting should only be used for subwoofer applications.
- **Source Select (XN3410 only)**
  *2CH BASS:* Uses CH1/2 inputs and has output from all 4 channels with Bass Boost.
  *2CH:* Uses CH1/2 inputs and has output from all 4 channels. The Bass Boost will work only on CH1/2 and have no effect on CH3/4.
  *4CH:* Uses all 4 channel inputs and has output from all 4 channels. The Bass Boost will work only on CH1/2 and have no effect on CH3/4.





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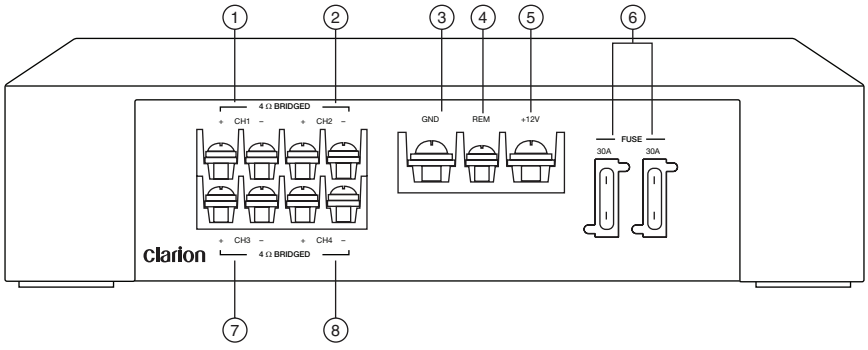
- **Output Mode Selector Switch: CH 1/2 and CH 3/4 (XN3410 only)**
  *STEREO:* Full left and right stereo operation.
  *CH1Mono / CH2 Mono:* Single channel input for bridged operation. This is especially useful in high-powered systems. (Uses CH2 and CH4 inputs.)
  *CH1/2 Mono / CH3/4 Mono:* Allows for a stereo input to be summed into a mono output.
- **CH1/2 FREQ / CH3/4 FREQ (XN3410 only)** The CH1/2 crossover frequencies are adjustable from 55Hz to 550Hz. While CH3/4 crossover frequencies are adjustable from 55Hz to 5500Hz (via the Frequency Range Multiplier) for a wider range of crossover points. Use this feature along with your speaker manufacturer's recommended crossover frequencies to quickly design a more advanced system.
  NOTE: If either of the Crossover Mode Switches is set to OFF, varying the frequency control will have no effect.
- **CH1/2 Filter / CH3/4 Filter (XN3410 only)** A filter is activated by sliding the CH1/2 and CH3/4 filter switch to either HP = High Pass or LP = Low Pass. CH1/2 is fully adjustable from 55-550Hz (via CH1/2 Freq) and CH3/4 is fully adjustable from 55-5500Hz (via CH3/4 Frequency and Frequency Range Multiplier). Use this feature along with your speaker manufacture's recommended crossover frequencies to design a more advanced system.

## ***CONNECTIONS FOR POWER AND SPEAKERS***

The rear panel of the XN3410 and XN3210 contains power and speaker connections as shown below.

**Fig. 2**
**XN3410**




1. CH1 Speaker Output
2. CH2 Speaker Output
3. Ground
4. Remote Turn-on
5. Battery +12V Input
6. (2) - 30 Amp Fuse
7. CH3 Speaker Output
8. CH4 Speaker Output



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**XN3410** - Electrical Connection

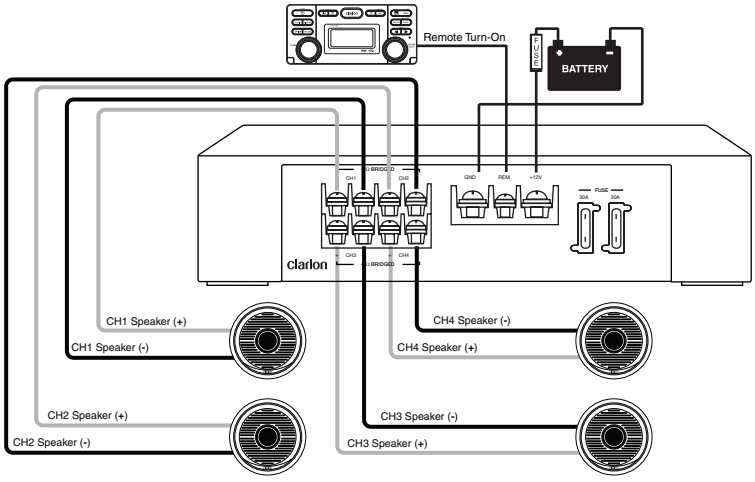
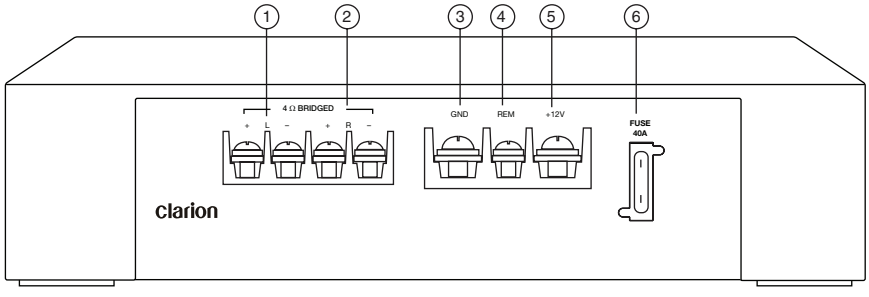
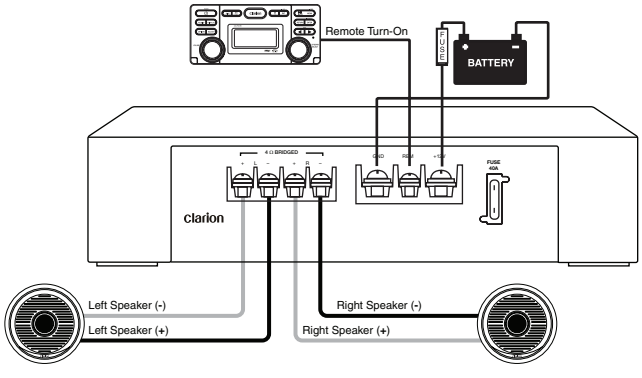



**Fig. 3**
**XN3210**




1. Left Speaker Output
2. Right Speaker Output
3. Ground
4. Remote Turn-on
5. Battery
6. 40 Amp Fuse

**XN3210 - Electrical Connection**



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## *INSTALLATION*

This section suggests Mounting and Wiring Precautions for installing the Clarion XN3210 and/or XN3410 amplifier(s). If you do not posses the necessary tools and installation experience, do not attempt to install these amplifiers. Instead, contact your local Clarion Marine Audio dealer to perform the installation.

## *MOUNTING PRECAUTIONS*

Prior to mounting the amplifier, make sure it is safe to mount the amplifier in that location. Failure to do so can result in serious damage to the boat. In addition, stainless steel hardware should be used to mount the amplifier and additional accessories. When possible, use a nut and bolt with a lock washer to secure the amplifier. Extra care and attention is necessary in marine installations due to the uncertainty of water conditions.

Additional precautions and suggestions:

1. For the most efficient cooling, mount the amplifier so cool air runs along the length of the heat sink, rather than across them. To increase air movement and circulation, a cooling fan can be installed.
2. Mount the amplifier on a rigid surface; avoid mounting to subwoofer enclosures or areas prone to vibration.
3. Prior to drilling and holes, make sure the proposed mounting holes will not cut into the fuel tank, fuel lines, electrical wiring, or through the boat.
4. Do not mount the amplifier where it is susceptible to water.

## *WIRING PRECAUTIONS*

Read all of the wiring precautions prior to making any connections. If you are unsure and/or don't have the necessary installation hardware, contact your local Clarion Marine Audio dealer to perform the installation.

1. Before you begin the installation, make sure the source unit Power switch is in the OFF position.
2. Disconnect the negative (-) lead of the battery (or batteries) before making any power connections.
3. When making connections, be sure that each connection is clean and secure. Insulate final connections with electrical tape or shrink tubing. Failure to do so may damage your equipment.
4. A good ground is critical for the performance of the amplifier. A ground wire should be run directly from the battery to the amplifier. Use black insulated 10-gauge or larger wire for the amplifier's ground (-) power lead.
5. Add an additional fuse holder and fuse at the positive (+) terminal of the battery. The fuse rating should equal the total current consumption at full output of the amplifier(s). Use red insulated 10-gauge or larger wire for the amplifier's positive (+) power lead. Do not install the fuse until the complete installation has been performed.
6. When replacing the amplifier's fuse, always use one having the same amperage rating. Substituting a higher rated fuse or a slow-blow type can result in serious damage to the amplifier.



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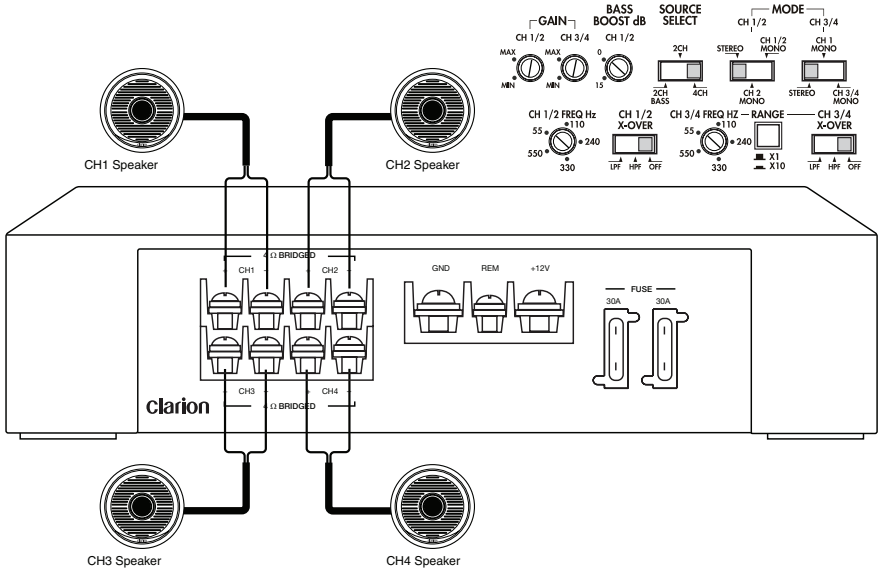
7. When creating passage holes for power cables, RCA's cables, and speaker wires, use grommets to eliminate any sharp edges created during drilling. This will protect the wire from being nicked and causing a short circuit.
8. Extra cable can cause signal loss and act as an "antenna" for noise. Use only high-quality RCA cables that are no longer than necessary.
9. In multiple amplifier systems, it is recommended to use a relay on the remote turn-on lead of the radio.



## *XN3410 WIRING AND APPLICATIONS*

The Clarion XN3410 4-channel marine audio amplifier can be used in a variety of system applications. Here are some examples to help plan your own installation.

**Fig. 4**
**4-Channel Full Range Stereo System**




In this application, the XN3410 is used as a 4-channel amplifier to drive four full range speakers in stereo.



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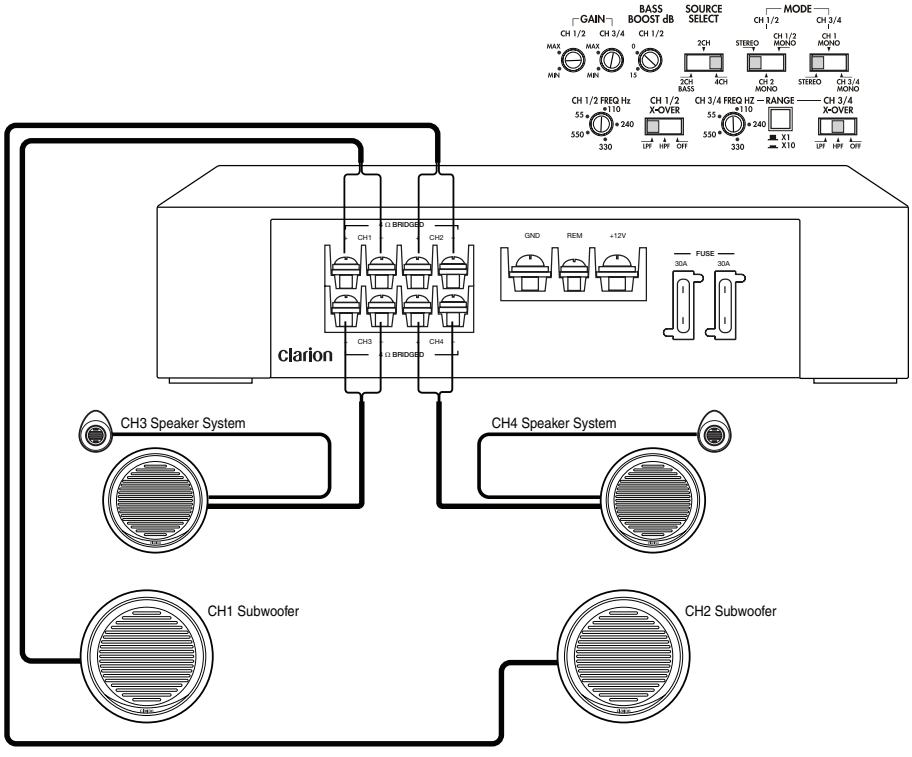
**Fig. 5**
**4-Channel Stereo System,**
**2-Channel High-Pass, 2-Channel Low-Pass**




In this 4-channel system, the XN3410 drives a pair of stereo satellites for the front and a pair of subwoofers. **Note the filter settings**.



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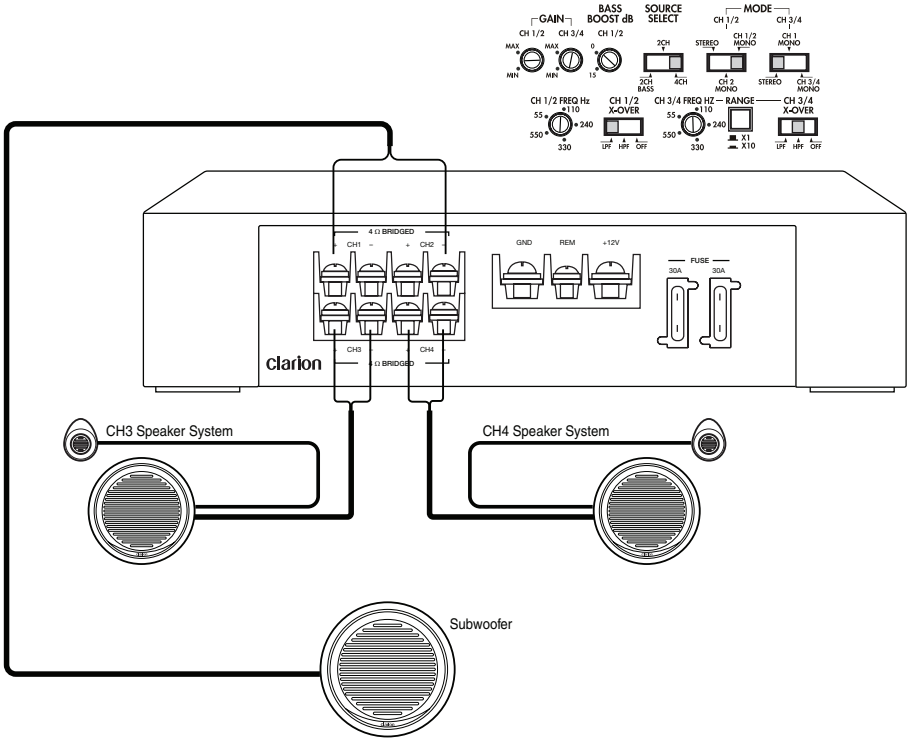
**Fig. 6**
**2-Channel Stereo System with Low-Pass Bridged Mono Channel**




The XN3410 can also be used to drive a pair of stereo satellites for the front and a single mono subwoofer for the rear. **Note the filter settings**.





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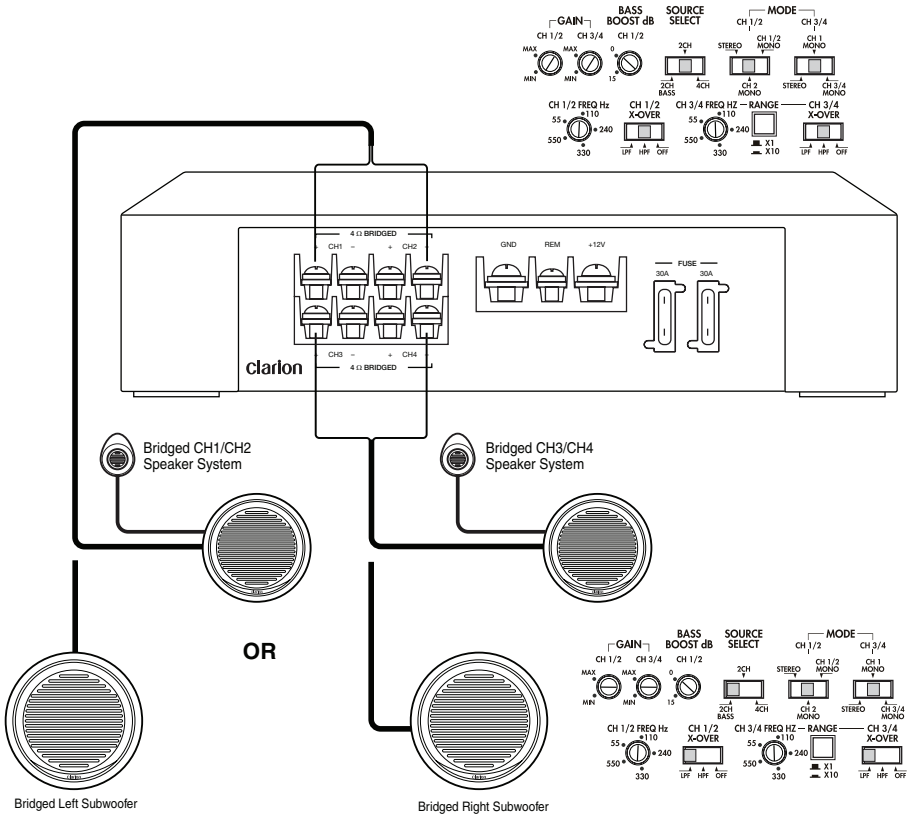
**Fig. 7**
**2-Channel High Power System (Satellite or Subwoofer)**




The XN3410 can be set up as a 2-channel high power amplifier to drive a pair of satellites (or subwoofers)



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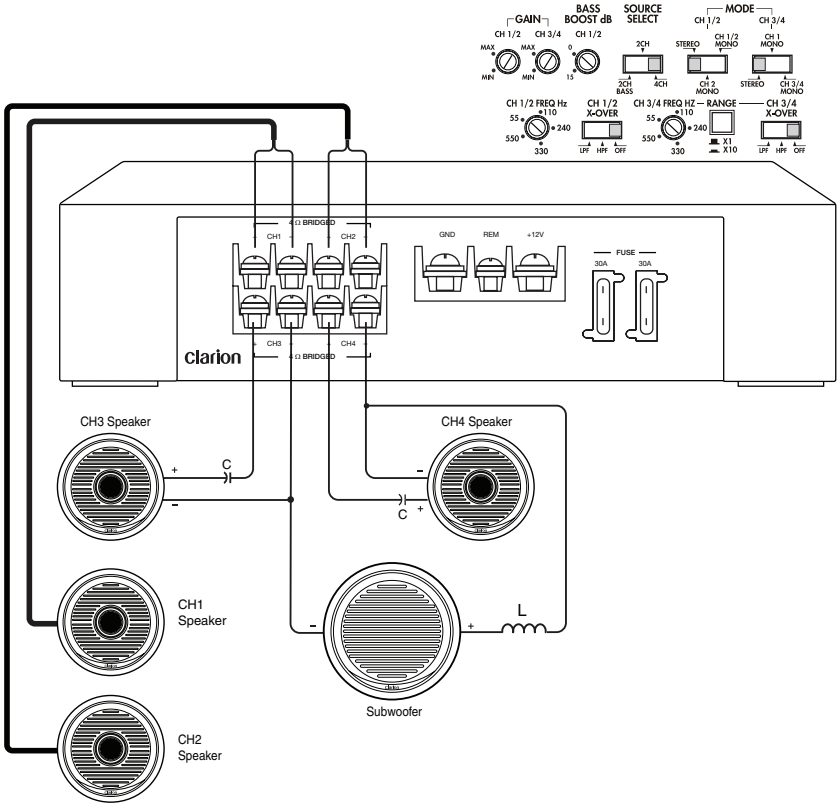
**Fig. 8**
**Mixed Mode System On CH3/CH4, Full Range Speakers On CH1/CH2**




| FREQ (Hz) | L (mH) | C (µF) |
|---|---|---|
| 80 | 8.0 | 497 |
| 100 | 6.4 | 398 |
| 125 | 5.1 | 318 |
| 150 | 4.2 | 265 |
| 200 | 3.2 | 199 |

**NOTE:** Chart values based on 4 Ohm speakers.

The amplifier can be configured for a mixed-mode operation on either channels 1/2 or 3/4 amplifier sections. The table provides component values to create a 6dB per octave crossover at specified frequencies. Use components that have a ± 5% tolerance and capacitors rated at 100V.
**NOTE:** Choose the same frequency for both LP and HP crossovers. Do not overlap frequencies, as this may damage the amplifier.



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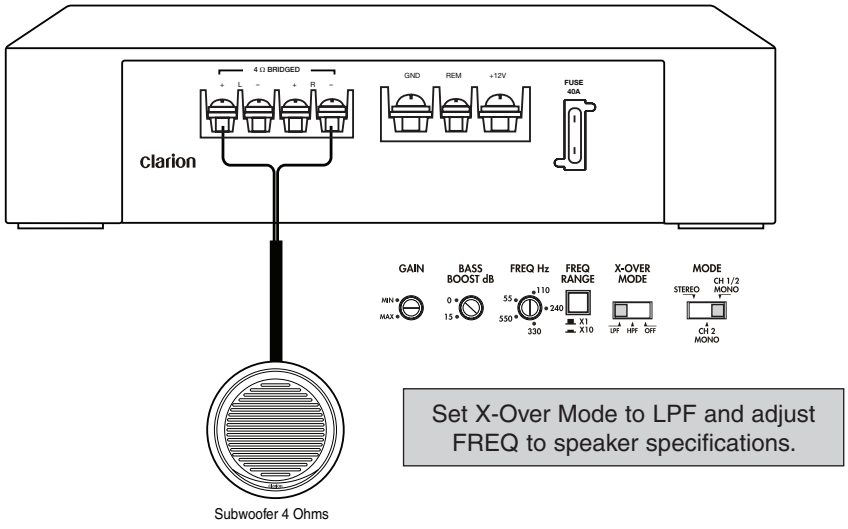
## *XN3210 WIRING AND APPLICATIONS*

The Clarion XN3210 2-channel marine audio amplifier can be used in a variety of system applications. Here are some examples to help plan your own installation.

**Fig. 9**
**Bridged - Mono Subwoofer System**




In this application the amplifier is bridged for mono operation to drive a subwoofer.
**Note the filter settings.**



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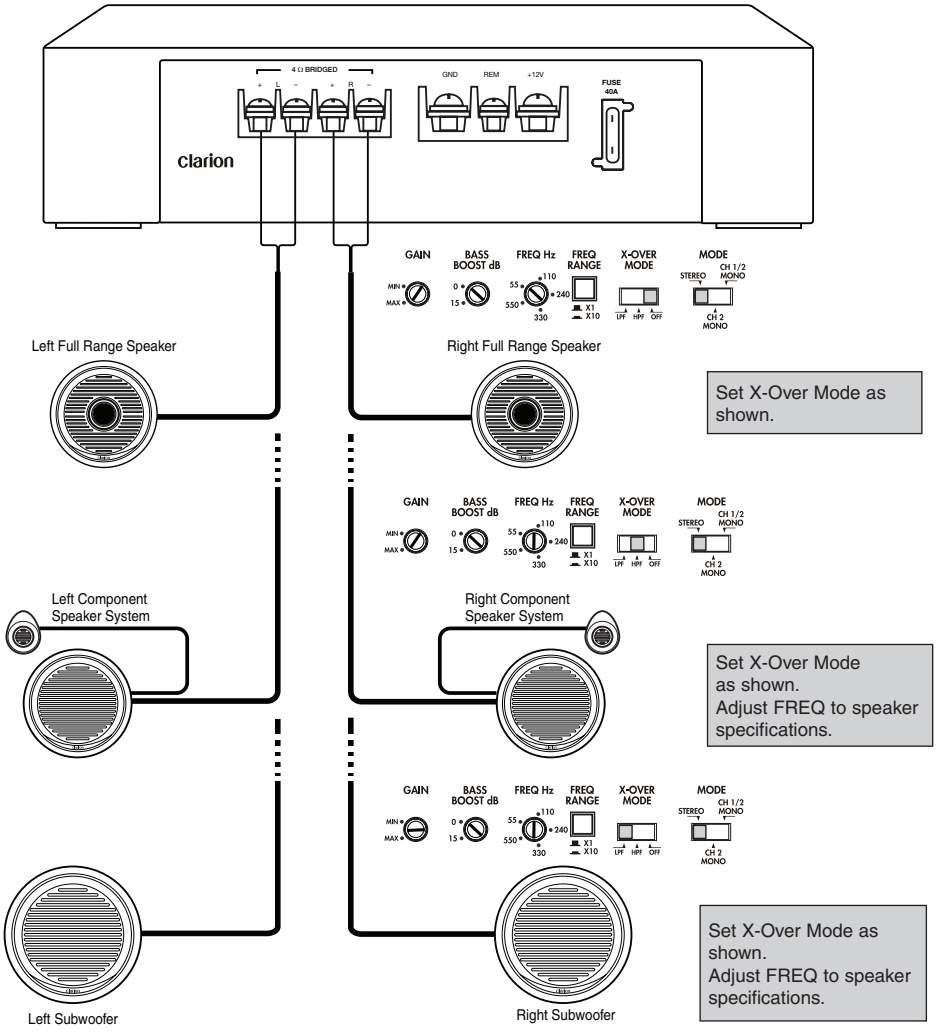
**Fig. 10**
**2-Channel Full-Range, Satellite, or Subwoofer Stereo System**
(Set INPUT SELECT Switch to STEREO)




In this application, the amplifier is used in stereo and drives two full-range (or satellite or subwoofer) speakers.
**Note the filter settings.**



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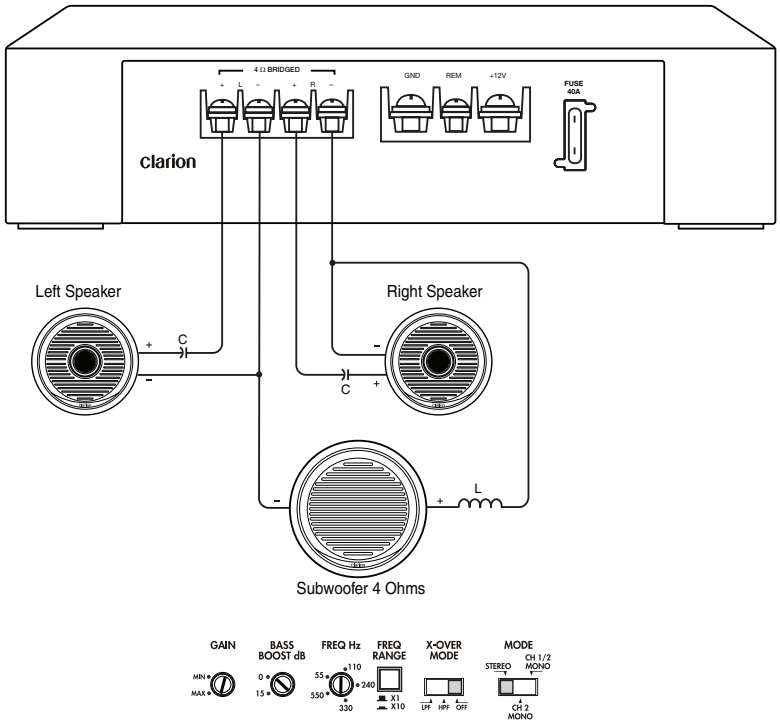
**Fig. 11**
**Mixed-Mode Satellite and Subwoofer System**
(Set INPUT SELECT Switch to STEREO)







| FREQ (Hz) | L (mH) | C (µF) |
|---|---|---|
| 80 | 8.0 | 497 |
| 100 | 6.4 | 398 |
| 125 | 5.1 | 318 |
| 150 | 4.2 | 265 |
| 200 | 3.2 | 199 |

**NOTE:** Chart values based on 4 Ohm speakers.

The amplifier can be configured for a mixed-mode operation. The table provides component values to create a 6dB per octave crossover at specified frequencies. Use components that have a + 5% tolerance and capacitors rated at 100V.
**NOTE:** Choose the same frequency for both LP and HP crossovers. Do not overlap frequencies, as this may damage the amplifier.



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## *SETTING THE GAIN*

After completing the installation, follow these steps to set the Gain Control and then perform the Final System Check.

1. Turn the Gain Control all the way counter-clockwise.

2. Turn the ON/OFF Switch on the source units to the ON position. Set all Tone or Equalization Controls to "flat" positions and turn Loudness off.

3. Play a CD, set the Volume Control at 75% of full level.
   NOTE: If the system uses an equalizer, set its frequency controls to "flat" positions.

4. Slowly increase the Gain Control. Stop when you hear a slight distortion of audio.

## *SETTING THE CROSSOVER*

The Clarion XN3210 and XN3410 feature fully adjustable high and low pass crossovers. To set the crossover, follow these steps.

1. Using the X-Over Mode Switch, select the desired mode: LP for Low Pass, HP for High Pass or OFF for Full Range.

2. Using the Freq (Hz) Selection Control, select the desired frequency. If the desired frequency exceeds the range of the Freq (Hz) Selection Control, press the Crossover Frequency Multiplier Switch to increase the value by a multiplier of 10.
   • For example, 55Hz x 10 = 550Hz or 550Hz x 10 = 5.5kHz.

3. Repeat steps 1 and 2 for both the CH1/CH2 and CH3/CH4 crossovers on the XN3410.

## *SETTING THE SUBWOOFER BASS BOOST*

1. Initially set the Bass Boost control to its full left position (i.e. 0dB).

2. Listen to a variety of music styles (e.g. Rock, Rap, etc.) and slowly increase the Bass Boost control until a noticeable increase in low bass response is perceived.

3. Slowly adjust the Bass Boost control (up or down) to realize the best bass response.

   **CAUTION:** If you hear a "pop" (due to speaker over-excursion), lower the Bass Boost to prevent speaker damage. If the system sounds muddy and distorted (due to amplifier clipping), lower Bass Boost to avoid shutdown from overheating.



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## *FINAL SYSTEM CHECK*

1. Turn on the source unit. After a two-second delay, slowly increase the Volume Control and listen to the audio. If you hear any noise, static, distortion or no sound at all, check the connections and refer to the Troubleshooting section. Depending on your system design, the levels may become quite loud even at low Volume Control settings. Until you get an "audio feel" of the system's power, use care when adjusting controls.

2. Turn the Balance Controls to their extreme positions and listen to the results. Audio imaging should match control settings (audio from the left speaker when balance is left).

3. Increase the volume and verify that the amplifier reproduces audio (at full frequencies) without distortion. If you hear distortion, check the connections and verify that the Gain Control is set correctly. Another possibility is damaged speakers or under-powered speakers. Refer to the Troubleshooting section for additional help.

## *TROUBLESHOOTING*

***Problem***

No Audio.

***Solution***

Low or no remote turn-on voltage. Check remote connections at amplifier and source unit.

Blown amplifier fuse. Replace with new fast-blow fuse (same rating).

Power wires not connected. Check battery and ground wiring at amplifier; also check battery connections.

Speaker leads shorted. Check speaker continuity to ground, it should not show a common ground.

Speakers not connected or are blown. Check speaker connections at amplifier, measure coil impedance.

***Problem***

Audio cycles on and off.

***Solution***

Thermal protection circuits are shutting amplifier off. Check location for adequate ventilation; consult an authorized Clarion dealer.



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***Problem***
Distorted audio.

***Solution***
Gain is not set properly, or damaged speaker cones. Review Setting Gain; inspect each speaker cone for signs of damage (i.e. frozen cone, burning smell, etc.)

***Problem***
Audio lacks punch.

***Solution***
Speakers wired incorrectly, which causes cancellation of bass frequencies. Check polarity of wires from amplifier to each speaker as defined by the system design.

***Problem***
Amplifier fuse keeps blowing.

***Solution***
Incorrect wiring or short circuit. Review Installation and check all wiring connections.

***Problem***
Whining or ticking noise in the audio with engine on.

***Solution***
Amplifier is picking up alternator noise or radiated noise. Turn down input gain; move audio cables away from power wires. Check power and ground connections on amplifier; install an in-line noise filter on source unit's power wire; check alternator and/or voltage regulator; test for weak battery or add water to battery.

## *PRODUCT SPECS*

| **MODEL** | **XN3410** | **XN3210** |
|---|---|---|
| Frequency Response | 20Hz ~ 20kHz | 20Hz ~ 20kHz |
| Signal To Noise Ratio | >97db | >95db |
| THD | .10% all channels driven | .10% all channels driven |
| Input Sensitivity Low Level | 200mV ~ 6.0V | 200mV ~ 6.0V |
| Input Sensitivity Speaker Level | 500mV ~ 13V | 500mV ~ 13V |
| Max. Power Output | 720W (180W x4) | 360W (180W x2) |
| Cont. Power Output | 360W (90W x4) @ 1.0% THD | 180W (90W x2) @ 1.0% THD |
| 2-Ohm Stereo Output | 165W x 4 @ 1.0% THD | 150W x 2 @ 1.0% THD |
| Bridged Power | 330W x 2 @ 1.0% THD | 250W x 1 @ 1.0% THD |
| Dimensions | 2-9/16" H x 9" W x 17-3/4" L | 2-9/16" H x 9" W x 13" L |
| Current Consumption output @ max power | 58A @ 720 Watts | 29A @ 382 Watts |





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